NASA GSFC Supply Chain Concerns and a New Approach for Handling Commonly-used Components

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Agenda

- Space Supply Chain general concerns
- Impacts to GSFC
- Traditional approach for handling build-to-print and inherited items
- New risk-based approach

Space Supply Chain Concerns

- Reduction of funding in space combined with ITAR regulations have greatly reduced supplier competition in many areas
- We've been reduced to few options for many components
- Europe is the only option in some cases
- Limited supplier competition results in development practices that can be outside of GSFC's comfort zone
- In some cases, there is a concern that products will not be available at all

Example Components

- Star Trackers
- Gyros/IMUs
- Reaction Wheel Assemblies
- Magnetometers
- Torquer bars
- Ground System Programmable Telemetry Processors
- Battery Relays
- High performance stepper motors and actuators
- Piezoelectric motors

“Traditional” GSFC SMA practices

- Strongly requirements-based
- Commercial practices only by exception
- Previously-developed and build-to-print items required to meet all requirements or work through standard MRB process
- Treatment of each item as if it is the first time we’ve seen it

Practices/features that have caused "unease" at GSFC

- Pure Sn/insufficient Pb/prohibited materials
- Board modifications (white wires, etc)
- Level 3 or COTS parts
- Use of bare board specs outside of our common requirements
- Use of unfamiliar workmanship standards
- Use of Table 2 or Table 3 materials

Previous approach of handling COTS/ inherited/build-to-print items

- Generally bottoms up approach for each project
- Standard parts control board approvals
- Acceptance based on elements and processes vs component-level assessment
- Emphasis on requirements, risk generally considered when push comes to shove
- Rejection of modified boards based on quantity and appearance

Transition to Risk-based approach

- Early discussion about inherited items being brought to the table
- Directives for proactively handling inherited items
  - Based on changes from previous developments
    - Design
    - Environment
    - Failures and anomalies
  - Based on assessment of elevated risk
- Component level qualification and history
- Use of Commodity Risk Assessment Engineer
- Focus is on “what is new” and risk areas determined from past history

CRAE: Commodity Risk Assessment Engineer (CRAE)

Commodity: Tangible or intangible entity that has a major impact on risk, cost or schedule for GSFC projects

- Expert in key discipline area with background and experience with reliability and risk
  - Responsible and empowered to assign risks based on warnings, alerts, environments, and "what we are stuck with"
    - Establishes testing programs and protocols to keep up with current design practices and common parts and components
      - Sets the policies for the risk-based decisions on use of parts, components, and processes
        - Establishes layers of risk reduction based on risk classification (ownership of GPR 8705.4)
          - Determines the acceptability and risk of alternate standards or requirements, or deviations and non-conformances
            - Answers, *"are we ok?" "why are we ok?" "how ok are we?"*
              - Provides risk assessment to the project for the project to decide how they want to disposition

Standard Components CRAE

- Center lead over all Standard Components responsible for
  - Standard Components Commodity Usage Guidelines
  - Capturing lessons learned for each project usage, from procurement, through development, to on-orbit experiences
  - Interface to orgs outside of GSFC
  - Determining risk for unusual usage, or for nonconforming or out-of-family standard components
  - Establish testing and qualification programs as needed
- Focus on applying consistent processes across all projects, focused on the “deltas”, and not repeating the same requests
- Approval in the past may not guarantee approval on current project if the risk posture, lifetime, redundancy, or environment has changed

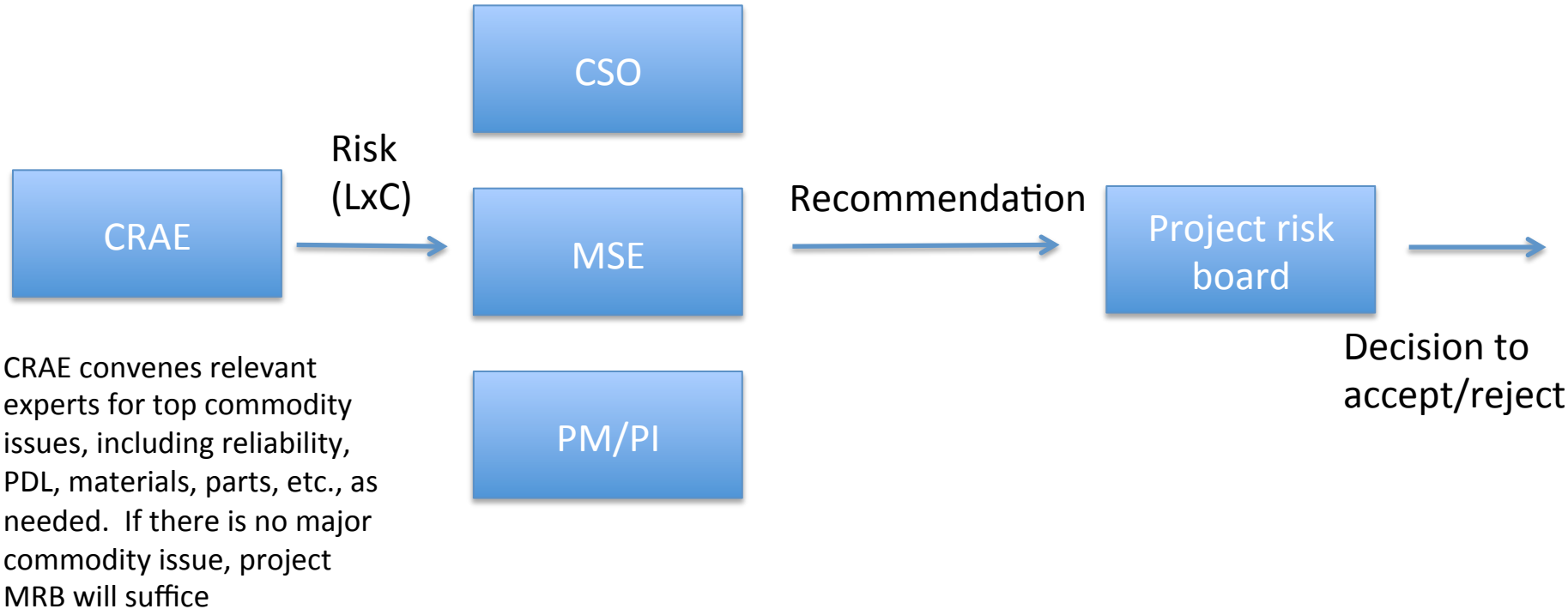
Standard Components Commodity Usage Guidelines

- GSFC-determined derating or usage limits for components
- History of workmanship standards applied, expectations, and ground experiences
- Known EEE parts outside of GSFC's experience base
- Known materials outside of GSFC's experience base
- Ground and on-orbit nonconformance, anomaly, and failure history
- Prior risk assessments

Acceptance of Inherited Items

- Information provided upfront
- Review and analysis
- Risk Assessment performed
- Risk LxC and statement provided to the CSO
- CSO and Project make the call on acceptance based on risk-level
- Results are documented at the Center level

Decision-Making Process



CRAE convenes relevant experts for top commodity issues, including reliability, PDL, materials, parts, etc., as needed. If there is no major commodity issue, project MRB will suffice

Conclusions

- Reduced aerospace funding has resulted in a reduction of suppliers for many common components
- Reduced competition has subsequently reduced GSFC's leverage to have everything built "our way"
- GSFC is transforming to more efficiently handle build-to-print and inherited items, based on the risk to the project